SARDAR PATEL UNIVERSITY

Vallabh Vidyanagar

NAAC 'A' Grade (10-01-2023 To 09-01-2028)

NEP-2020 aligned Curriculum with effect from Academic Year 2026-27

Master of Science Quality and Productivity Management Semester-II

Course Type	Course Code	Course Title	Teaching-Learning Scheme	Total Notional Hours	Course credits
			L-P-T		
DSC	**P2S02NCQPM01**	Fundamental of HRM and supply Chain Management	4-0-0	120	04

- **Course Learning Outcomes (CLOs)**

On completion of this course, students will be able to:

CLO1: Evaluate human resource management concepts and procurement practices to enhance organizational effectiveness.

CLO2: Formulate human resource strategies integrating planning, selection, and quality management practices for workforce development.

CLO3: Analyze employee management and performance systems within Total Quality Human Resource Management to improve organizational performance.

CLO4: Integrate supply chain management strategies with organizational processes to achieve operational efficiency and strategic alignment.

CLO5: Design integrated HR and supply chain systems aligned with quality and productivity principles to drive organizational competitiveness.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	Foundations and Strategic Role of Human Resource Management • Elements of Human Resource Management: Introduction, meaning, definition, nature and scope of HRM and HRD, features, functions, objectives, policies, procedures, programmes and practices; Role of HR manager as line/staff and strategic partner; Opportunities and challenges in HRM; Evolution of HRM, HR models, HR environment and SHRM. • Organization of HR function: Structure of HR department, linkages with other functions, personnel policies and principles, HRIS, Human Capital Management, global HRM and social system approach.	CL CBL PBL MP	1 3 4 5
II	Human Resource Procurement and Deployment • Job design and Job analysis; HR planning: definition, need, benefits, factors affecting HRP, demand forecasting; Recruitment: policy, sources, techniques, process, cost-benefit analysis, yield pyramid and succession planning. • Selection, placement and induction: selection process, tests, interview techniques, work sampling, induction programmes, placement issues and evaluation of induction effectiveness.	CL CBL PBL MP	1 2 5

III	Total Quality Human Resource Management (TQHRM) • Employee Management System: career planning, role clarity, performance evaluation, development planning, coaching, mentoring, rewards, feedback, work system redesign and flexible structures. • Empowered Management System: alignment, capability, commitment, self-managed teams, quality circles, suggestion schemes, participation, information sharing, innovation focus and comparison between HRM and TQHRM.	CL PBL MP	2 3 5
IV	Fundamentals of Supply Chain Management • Basic concepts, scope and importance of SCM; Logistics vs SCM; global supply chain scenario; supply chain participants, channel agencies, extended enterprise and relationship management; bullwhip effect. • Supply chain strategy and drivers: decision phases, process view, strategic fit, drivers (facilities, inventory, transportation, information, sourcing, pricing), obstacles and performance framework.	CL	4 5

- **Learning Pedagogies/Methods**
  (a) Classroom Lecture (CL)
  (b) Case-Based Learning (CBL)
  (c) Micro-Projects (MP)
  (d) Problem-Based Learning (PBL)
  (e) ICT-Enabled Learning through Digital Resources/ Virtual Labs/Webinars (ICT EL)

- **Assessment Methodologies**

(A) Internal Assessment

a. Internal Formative assessment

i. MCQ and Objective question Quiz: Students select or give the correct answer from the list of options four /none for a given question.

ii. Assignment: A practical task or setup questions given to measure a student's knowledge, skill and ability in subject or field.

iii. Seminar: A student-led academic activity designed to evaluate student's ability to research, understand, and present a specific topic.

iv. Group Discussion: An interactive method to asses a student's personality and inter- personal skills in team setting. It typically involves 5 to 15 participants discussing a topic for 15 to 30 minutes in presence of an observer.

b. Internal Summative Assessment

i. Mid-term tests
A test conducted roughly halfway through an academic term or semester.

ii. Laboratory performance
Students demonstrate their laboratory hands-on performance skills, knowledge and ability to apply concepts in subjects.

iii. Viva-voce

An oral examination conducted to evaluate a student's in-depth knowledge, understanding, and critical thinking regarding a subject or project.

(B) Weightage of Learning Efforts for External Assessment

Unit	Aligned CLOs	Total Learning Hours	Approximate weightage (Marks) to Learning levels (BT)			Total Marks
			Remember (R)	Understanding (U)	Application/ Analyse & above (A)	
I	1,3,4,5	30	4	5	3	12
II	1,2,5	30	4	5	4	13
III	2,3,5	30	4	5	4	13
IV	4,5	30	3	5	4	12
		120	**15**	**20**	**15**	**50**

- **Assessment and Evaluation**

Sr. No.	Assessment/Evaluation	Component	Weightage (%)
1	Continuous Internal Evaluation	FA: Seminars, Assignments, Quizzes, Group Discussion	25%
		SA: Mid Term Test	25%
2	End-Semester Examination	Written Exam	50%

(C) CLOs – PLOs Matrix

CLO	PLO												
	1	2	3	4	5	6	7	8	9	10	11	12	13
CLO1	-	-	-	-	**2**	-	-	-	-	**2**	-	-	-
CLO2	-	**2**	-	**2**	**2**	-	-	-	-	**3**	-	**2**	-
CLO3	-	-	-	**2**	**3**	-	**2**	**2**	-	**3**	-	**2**	-
CLO4	-	**1**	-	**2**	**2**	-	**2**	**3**	-	**1**	-	**2**	-
CLO5	-	**2**	-	**3**	**2**	**1**	**3**	**2**	-	**3**	**1**	**2**	-

CLO – PLO correlation	Value
Strong	3
Moderate	2
Low	1
No correlation	-

- **Suggested Learning Materials Books:**

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	Human Resource Management: Text and Cases	V. S. P. Rao	2005	Excel Books

2	Human Resource Management	Gary Dessler & Biju Varkkey	16th/2020	Pearson Education
3	Supply Chain Management: Strategy, Planning and Operation	Sunil Chopra & Peter Meindl	3rd/2007	Pearson Education
4	Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies	David Simchi-Levi et al	2nd/2003	McGraw-Hill
5	Supply Chain Management: Concepts, Practices and Implementation	Sunil Sharma	2010	Oxford University Press4

- **Online Resources (Open Source)**

Sr. No.	Description of Resource(s)	Weblink
1	Alison Free Online Courses	https://alison.com
2	Great Learning Academy	https://www.mygreatlearning.com/academy

Master of Science Quality and Productivity Management Semester-II

Course Type	Course Code	Course Title	Teaching-Learning Scheme	Total Notional Hours	Course credits
			L-P-T		
DSC	**P2S02NCQPM02**	Market Research	4-0-0	120	04

- **Course Learning Outcomes (CLOs)**

On completion of this course, students will be able to:

CLO1: Demonstrate comprehensive understanding of marketing research concepts, processes and their role in managerial decision-making.

CLO2: Analyze marketing research problems and apply appropriate research designs, methodologies and approaches in different business contexts.

CLO3: Apply measurement, scaling, questionnaire design and sampling techniques for accurate and reliable primary data collection.

CLO4: Analyze and evaluate data using appropriate statistical and multivariate techniques for effective interpretation and decision-making.

CLO5: Evaluate and present structured research reports with clear interpretation, visual presentation and ethical considerations.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	Fundamentals of Marketing Research and Problem Definition • Introduction to Marketing Research (MR): Definition and classification of MR, The MR process, The Role of MR in Decision Making, Management Information System and Decision Support System, A case Study. • Defining MR problem and Developing an Approach: Importance of Defining MR problem, the process of defining the problem and developing an approach, Tasks involved, Environmental context of the problem-Buyers Behaviour, Legal and Economic Environment. Marketing and technological skills.	CL PBL ICT EL	1 2
II	Research Design in Marketing Research • Research Designs: Exploratory research design using secondary data, comparison of primary and secondary data. Advantages, uses and disadvantage of secondary data. Classification and sources of secondary data. Qualitative Research using Focus Group interview, Depth interviews, Projective Techniques. • Descriptive Research Design: Descriptive research through survey and observations–Telephone Methods, Personal Methods, Mail Methods, Electronic Methods and Observational Method. Causal research–Basic experimental designs – internal and external validity of experiments.	CL PBL ICT EL CBL	2 3
III	Primary Data Collection, Measurement and Sampling Techniques in Marketing Research • Measurement, Scaling and Sampling Design: Primary Data, Comparative and Non comparative Scaling Techniques, Questionnaire and Form Design, Sampling Designs, Initial and	CL ICT EL PBL CBL	3 4

	Final Sample size determination. • Data Collection, Preparation, Analysis and Reporting: Field Work, Data Preparation, Review of data compilation, data presentation and data analysis.		
IV	Applications of Multivariate Techniques and Research Reporting • Applications of Multivariate Techniques: Brief Discussion on uses of multivariate techniques, multiple regression, discriminant and Logit Analysis, Factor Analysis, Cluster Analysis. • Report Preparation and Presentation: Structure of a research report, Data interpretation and presentation, Use of tables, charts and graphs, Report writing techniques, Oral Presentation skills, Ethical considerations in reporting.	CL CBL MP ICT EL	4 5

- **Learning Pedagogies/Methods**

  (f) Classroom Lecture (CL)
  (g) Case-Based Learning (CBL)
  (h) Micro-Projects (MP)
  (i) Problem-Based Learning (PBL)
  (j) ICT-Enabled Learning through Digital Resources/ Virtual Labs/Webinars (ICT EL)

- **Assessment Methodologies**

  (D) Internal Assessment

  a. Internal Formative assessment (25 Marks)

  v. MCQ and Objective question Quiz: Students select or give the correct answer from the list of options four /none for a given questions.
  vi. Assignment: A practical task or setup questions given to measure a student's knowledge, skill and ability in subject or field.
  vii. Seminar: A student-led academic activity designed to evaluate student's ability to research, understand, and present a specific topic.
  viii. Group Discussion: An interactive method to asses a student's personality and inter- personal skills in team setting. It typically involves 5 to 15 participants discussing a topic for 15 to 30 minutes in presence of an observer.

  b. Internal Summative Assessment (25 marks)

  (a) Mid-term tests
  A test conducted roughly halfway through an academic term or semester.
  (b) Laboratory performance
  Students demonstrate their laboratory hands-on performance skills, knowledge and ability to apply concepts in subjects.
  (c) Viva-voce
  An oral examination conducted to evaluate a student's in-depth knowledge, understanding, and critical thinking regarding a subject or project.

Master of Science Quality and Productivity Management Semester-II

(E) Weightage of Learning Efforts for External Assessment

Unit	Aligned CLOs	Total Learning Hours	Approximate weightage (Marks) to Learning levels (BT)			Total Marks
			Remember (R)	Understanding (U)	Application/ Analyse & above (A)	
I	1, 2	30	4	5	3	12
II	2, 3	30	4	5	4	13
III	3, 4	30	4	5	4	13
IV	4, 5	30	3	5	4	12
		120	**15**	**20**	**15**	**50**

Assessment and Evaluation

Sr.No.	Assessment/Evaluation	Component	Weightage (%)
1	Continuous Internal Evaluation	FA: Seminars, Assignments, Quizzes, Group Discussion	25
		SA: Mid Term Test	25
2	End-Semester Examination	Written Exam	50

(F) CLOs – PLOs Matrix

CLO	PLO												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
CLO1	**2**	**1**	**1**	**2**	**1**	**1**	**-**	**1**	**1**	**1**	**1**	**1**	**-**
CLO2	**3**	**2**	**1**	**3**	**2**	**2**	**1**	**2**	**1**	**2**	**1**	**1**	**1**
CLO3	**3**	**2**	**1**	**2**	**1**	**3**	**1**	**1**	**2**	**1**	**2**	**1**	**-**
CLO4	**3**	**3**	**1**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**1**	**1**
CLO5	**3**	**2**	**1**	**2**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**

CLO – PLO correlation	Value
Strong	3
Moderate	2
Low	1
No correlation	-

- **Suggested Learning Materials Books:**

Sr.No.	Title	Author(s)	Edition/Year	Publisher
1	Research for Marketing Decisions	Paul Green, Donald Tull, Gerald Albaurn	Fifth Edition/1988	PHI
2	Marketing Research	Rajendra Nargundkar	2003	Tata McGraw-Hill
3	Marketing Research: An Applied Orientation	Malhotra Naresh K	Sixth Edition/2010	Pearson
4	Marketing Research – Measurement & Methods	Donald S. Tull, Del I. Hawkins	1990	McMillan
5	Marketing Research	Beri G. C.	Fourth Edition/ 2008	Tata McGraw Hill

- **Online Resources (Open Source)**

Sr.No.	Description of Resource(s)	Weblink
1	Marketing Research and Analysis By Prof. J. K. Nayak | IIT Roorkee	https://onlinecourses.nptel.ac.in/noc25_mg89/preview

Master of Science Quality and Productivity Management Semester-II

Course Type	Course Code	Course Title	Teaching-Learning Scheme	Total Notional Hours	Course credits
			L-P-T		
DSC	**P2S02NCQPM03**	Management of Productivity	4-0-0	120	04

- **Course Learning Outcomes (CLOs)**

On completion of this course, students will be able to:

CLO1: Apply management functions (planning, organizing, staffing, leading, and controlling) to improve productivity in organizational settings.

CLO2: Analyze decision-making situations and develop solutions under various conditions for productivity and efficiency enhancement.

CLO3: Evaluate organizational structures, staffing practices, and leadership approaches to improve employee performance and overall productivity.

CLO4: Measure and interpret productivity using suitable performance indicators and offer improvement actions in manufacturing and service sectors.

CLO5: Construct productivity improvement strategies by considering sustainability, technological integration, and effective change management in organizations.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	Fundamentals of Management and Decision Making • Management Concepts, Functions, and Planning Essentials: The concepts of management including its nature, purpose, levels, and functions. Planning essentials covering types of plans, planning process, policies, and strategies. • Decision-making process: Rational decision making, decision making under certainty, uncertainty, and risk along with creativity and problem solving.	CL CBL	1 2
II	Organizing and Staffing Functions • Nature of organizing including formal and informal organization and departmentalization. • Staffing process including recruitment and selection, performance appraisal, and employee satisfaction.	CL CBL PBL	1 3
III	Leadership and Control Mechanisms • Leadership aspects including motivation theories (Maslow, Herzberg, Expectancy), leadership styles, trait and contingency approaches. • Controlling function including control process, control techniques, and role of information technology.	CL CBL PBL	1 3
IV	Productivity and Performance Management • Productivity concepts including meaning, nature, importance, factors affecting productivity, and productivity measurement techniques including labour	CL CBL MP PBL	4 5

	and capital productivity with performance indicators. Basic concepts of work study and standard time. • Measures to enhance productivity, application in manufacturing and service sectors, Basic understanding of capacity and demand estimation for productivity planning. Managing change and innovation, and role of technology in productivity enhancement.		

- **Learning Pedagogies/Methods**
  (k) Classroom Lecture (CL)
  (l) Case-Based Learning (CBL)
  (m) Micro-Projects (MP)
  (n) Problem-Based Learning (PBL)
  (o) ICT-Enabled Learning through Digital Resources/ Virtual Labs/Webinars (ICT EL)
- **Assessment Methodologies**

(G) Internal Assessment

a. Internal Formative assessment

ix. MCQ and Objective question Quiz: Students select or give the correct answer from the list of options four /none for a given question.

x. Assignment: A practical task or setup questions given to measure a student's knowledge, skill and ability in subject or field.

xi. Seminar: A student-led academic activity designed to evaluate student's ability to research, understand, and present a specific topic.

xii. Group Discussion: An interactive method to asses a student's personality and inter- personal skills in team setting. It typically involves 5 to 15 participants discussing a topic for 15 to 30 minutes in presence of an observer.

b. Internal Summative Assessment

iv. Mid-term tests
A test conducted roughly halfway through an academic term or semester.

v. Laboratory performance
Students demonstrate their laboratory hands-on performance skills, knowledge and ability to apply concepts in subjects.

vi. Viva-voce
An oral examination conducted to evaluate a student's in-depth knowledge, understanding, and critical thinking regarding a subject or project.

(H) Weightage of Learning Efforts for External Assessment

Unit	Aligned CLOs	Total Learning Hours	Approximate weightage (Marks) to Learning levels (BT)			Total Marks
			Remember (R)	Understanding (U)	Application/ Analyse & above (A)	
I	1,2	30	4	5	3	12
II	1,3	30	4	5	4	13
III	1,3	30	4	5	4	13
IV	4,5	30	3	5	4	12
		120	**15**	**20**	**15**	**50**

Master of Science Quality and Productivity Management Semester-II

- **Assessment and Evaluation**

Sr. No.	Assessment/Evaluation	Component	Weightage (%)
1	Continuous Internal Evaluation	FA: Seminars, Assignments, Quizzes, Group Discussion	25%
		SA: Mid Term Test	25%
2	End-Semester Examination	Written Exam	50%

(I) CLOs – PLOs Matrix

CLO	PLO												
	1	2	3	4	5	6	7	8	9	10	11	12	13
CLO1	-	-	-	2	1	-	-	-	-	-	-	2	-
CLO2	-	1	-	3	-	1	-	1	1	-	-	-	-
CLO3	-	-	-	2	2	1	-	-	1	2	1	2	2
CLO4	2	2	-	3	1	2	1	2	2	1	1	-	-
CLO5	1	2	1	3	2	2	1	2	1	2	2	1	1

CLO – PLO correlation	Value
Strong	3
Moderate	2
Low	1
No correlation	-

- **Suggested Learning Materials Books:**

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	Operations Management And Productivity Techniques	Mukherjee, P. N. and Kachwala, T. T.	2009	PHI
2	Principles of Management	Harold Koontz, Heinz Weihrich	2015	McGraw-Hill Education
3	Management	Stephen P. Robbins, Mary Coulter	13th /2017	Pearson Education
4	Organizational Behavior	Stephen P. Robbins, Timothy A. Judge	17th /2017	Pearson Education
5	Principles Of Management	M. Govindarajan and S. Natarajan	2007	PHI
6	Productivity and Quality Management	R. K. Suri, T. N. Chhabra	2009	Khanna Publishers

- **Online Resources (Open Source)**

Sr. No.	Description of Resource(s)	Weblink
1	An Introduction to the Principles of Management	https://alison.com/course/an-introduction-to-the-principles-of-management

Master of Science Quality and Productivity Management Semester-II

Course Type	Course Code	Course Title	Teaching-Learning Scheme L-P-T	Total Notional Hours	Course credits
DSC	**P2S02NCQPM04**	Statistical Method through SPSS	0-4-0	120	04

- **Course Learning Outcomes (CLOs)**

On completion of this course, students will be able to:

CLO1: Evaluate datasets using SPSS by applying data preparation, descriptive analysis, and exploratory techniques for meaningful statistical interpretation.

CLO2: Analyze relationships and differences among variables using appropriate statistical tests including chi-square, t-tests, ANOVA, and correlation.

CLO3: Construct statistical models using simple and multiple regression along with time series techniques for data-driven decision-making.

CLO4: Assess the validity of statistical models by diagnosing assumptions such as normality, multicollinearity, and heteroscedasticity and applying suitable remedies.

CLO5: Integrate statistical tools and SPSS functionalities to solve real-world problems through comprehensive data analysis and interpretation.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	Data Handling and Descriptive Analysis • Data Entry, Variable Definition, and Level of Measurement in SPSS • Data Management Techniques: Sorting, Filtering, Selecting Cases, and Handling Missing Values • Data Cleaning and Validation: Identifying Errors, Outliers, and Inconsistent Responses • Descriptive Analysis of Categorical Data: Frequency Tables, Bar Charts, and Pie Charts	ICT EL	1 5
II	Exploratory Data Analysis and Basic Statistical Testing • Cross Tabulation and Chi-Square Test of Independence with Association Measures • Exploratory Data Analysis for Interval Data: Histograms, Box Plots, and Normality Assessment • Computation and Interpretation of Measures of Central Tendency and Dispersion • Independent Samples T-Test: Assumptions, Execution, and Interpretation in SPSS • Paired Samples T-Test and Normal Probability Plot Analysis	ICT EL	1 2 4
III	Analysis of Variance and Relationship Analysis • One-Way ANOVA with Post Hoc Tests and Graphical Representation • Two-Way ANOVA: Interaction Effects and	ICT EL	2 3 5

	Interpretation of Results • Correlation Analysis and Scatterplot Interpretation in SPSS		
IV	Regression Diagnostics and Time Series Analysis • Simple and Multiple Linear Regression Analysis and Model Interpretation • Diagnostic Testing in Regression: Detection and Remedial Measures for Multicollinearity and Heteroscedasticity • Time Series Analysis in SPSS: Stationarity, Seasonality, and ARIMA Modelling	ICT EL	3 4 5

- **Learning Pedagogies/Methods**
  (p) Classroom Lecture (CL)
  (q) Case-Based Learning (CBL)
  (r) Micro-Projects (MP)
  (s) Problem-Based Learning (PBL)
  (t) ICT-Enabled Learning through Digital Resources/ Virtual Labs/Webinars (ICT EL)
- **Assessment Methodologies**

(J) Internal Assessment

a. Internal Formative assessment

xiii. Group Discussion: An interactive method to asses a student's personality and inter- personal skills in team setting. It typically involves 5 to 15 participants discussing a topic for 15 to 30 minutes in presence of an observer.

b. Internal Summative Assessment

vii. Mid-term tests
A test conducted roughly halfway through an academic term or semester.

viii. Laboratory performance
Students demonstrate their laboratory hands-on performance skills, knowledge and ability to apply concepts in subjects.

(K) Weightage of Learning Efforts for External Assessment

Unit	Aligned CLOs	Total Learning Hours	Approximate weightage (Marks) to Learning levels (BT)			Total Marks
			Remember (R)	Understanding (U)	Application/ Analyse & above (A)	
I	1,5	30	4	5	3	12
II	1,2,4	30	4	5	4	13
III	2,3,5	30	4	5	4	13
IV	3,4,5	30	3	5	4	12
		120	**15**	**20**	**15**	**50**

Master of Science Quality and Productivity Management Semester-II

- **Assessment and Evaluation**

Sr. No.	Assessment/Evaluation	Component	Weightage (%)
1	Continuous Internal Evaluation	FA: Seminars, Assignments, Quizzes, Group Discussion	25%
		SA: Mid Term Test	25%
2	End-Semester Examination	Written Exam	50%

(L) CLOs – PLOs Matrix

CLO	PLO												
	1	2	3	4	5	6	7	8	9	10	11	12	13
CLO1	3	-	-	-	-	3	1	-	3	-	-	2	-
CLO2	3	-	-	2	-	3	2	-	3	-	2	2	-
CLO3	3	-	-	2	-	3	-	-	3	-	-	2	-
CLO4	3	-	-	2	-	3	-	-	3	-	-	2	-
CLO5	3	-	-	3	-	3	3	-	3	-	2	3	-

CLO – PLO correlation	Value
Strong	3
Moderate	2
Low	1
No correlation	-

- **Suggested Learning Materials Books:**

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	Discovering Statistics Using IBM SPSS Statistics	Andy Field	6th/2022	SAGE Publications
2	How to Use SPSS: A Step-by-Step Guide to Analysis and Interpretation	Brian C. Cronk	11th/2024	Routledge
3	IBM SPSS Statistics for Introductory Statistics: Use and Interpretation	Karen Barrett, Nancy Leech	7th/2021	Routledge
4	Applied Statistics with SPSS	Eelko Huizingh	2007	SAGE Publications

- **Online Resources (Open Source)**

Sr. No.	Description of Resource(s)	Weblink
1	SPSS Navigation Guide	https://monu7433.github.io/Spss_Guide/

Master of Science Quality and Productivity Management Semester-II

Course Type	Course Code	Course Title	Teaching-Learning Scheme L-P-T	Total Notional Hours	Course credits
DSC	**P2S02NCQPM05**	Planning of Industrial Experiments Through Minitab	0-4-0	120	04

- **Course Learning Outcomes (CLOs)**

On completion of this course, students will be able to:

CLO1: Analyse the principles of basic experimental designs and evaluate treatment effects using CRD, RBD, LSD, and full factorial designs.

CLO2: Interpret and evaluate factorial experiments involving interaction effects, confounding, and partial confounding structures.

CLO3: Design and analyse fractional factorial and screening experiments to identify significant factors efficiently.

CLO4: Develop and optimize response surface models using Box-Behnken and Central Composite Designs for process improvement.

CLO5: Evaluate and optimize process parameters using Taguchi orthogonal arrays and signal-to-noise ratio analysis for robust design.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	• Analysis of CRD & RBD • Analysis of LSD • Analysis of a Full Factorial Design • Analysis of a Full Factorial Design	CL CBL ICT EL	1
II	• Yates Algorithm for Factorial Design • Analysis of a Full Factorial Design • Confounding in Factorial Design • Partial Confounding in Factorial Designs	CL CBL ICT EL	2
III	• Analysis of Fractional Factorial Designs • Plackett-Burman Design for Screening Factors • Foldover Design to Improve Resolution • Analysis of Box-Behnken Design	CL CBL ICT EL	3
IV	• Central Composite Design (CCD) Construction • Response Surface Analysis and Contour Plotting • Taguchi Orthogonal Array and S/N Ratio Analysis	CL CBL MP ICT EL	4 5

- **Learning Pedagogies/Methods**
  (u) Classroom Lecture (CL)
  (v) Case-Based Learning (CBL)
  (w) Micro-Projects (MP)
  (x) Problem-Based Learning (PBL)
  (y) ICT-Enabled Learning through Digital Resources/ Virtual Labs/Webinars (ICT EL)

- **Assessment Methodologies**

(M) Internal Assessment

a. Internal Formative assessment

xiv. Group Discussion: An interactive method to asses a student's personality and inter- personal skills in team setting. It typically involves 5 to 15 participants discussing a topic for 15 to 30 minutes in presence of an observer.

b. Internal Summative Assessment

(d) Mid-term tests
A test conducted roughly halfway through an academic term or semester.

(e) Laboratory performance
Students demonstrate their laboratory hands-on performance skills, knowledge and ability to apply concepts in subjects.

(N) Weightage of Learning Efforts for External Assessment

Unit	Aligned CLOs	Total Learning Hours	Approximate weightage (Marks) to Learning levels (BT)			Total Marks
			Remember (R)	Understanding (U)	Application/ Analyse & above (A)	
I	1	30	4	5	3	12
II	2	30	4	5	4	12
III	3	30	4	5	4	13
IV	4,5	30	3	5	4	13
		120	**15**	**20**	**15**	**50**

- **Assessment and Evaluation**

Sr. No.	Assessment/Evaluation	Component	Weightage (%)
1	Continuous Internal Evaluation	FA: Seminars, Assignments, Quizzes, Group Discussion	25
		SA: Mid Term Test	25
2	End-Semester Examination	Written Exam	50

(O) CLOs – PLOs Matrix

CLO	PLO														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLO1	3	2	-	2	-	1	-	-	2	-	-	1	-	-	-
CLO2	3	2	-	2	-	2	-	-	2	-	-	1	-	-	-
CLO3	3	3	-	2	-	2	-	-	2	-	-	1	-	-	-
CLO4	2	3	-	3	-	2	-	-	2	-	-	1	1	-	-
CLO5	2	3	-	3	-	2	-	-	2	-	-	1	3	-	-

CLO – PLO correlation	Value
Strong	3
Moderate	2
Low	1
No correlation	-

- **Suggested Learning Materials Books:**

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	Design and analysis of experiments	Douglas C. Montgomery	8th/2012	Wiley

- **Online Resources (Open Source)**

Sr. No.	Description of Resource(s)	Weblink
1	Design of Experiments Tutorials by Penn State	https://online.stat.psu.edu/
2	Minitab Support for Design of Experiments	https://support.minitab.com
3	Taguchi Methods and DOE Tutorials	https://www.itl.nist.gov/div898/handbook

Master of Science Quality and Productivity Management Semester-II

Course Type	Course Code	Course Title	Teaching-Learning Scheme	Total Notional Hours	Course credits
			L-P-T		
DSC	**P2S02NCQPM06**	Google Data Analytics	0-2-0	60	02

- **Course Learning Outcomes (CLOs)**

On completion of this course, students will be able to:

CLO1: Design data preparation workflows using spreadsheet functions to clean, transform, and organize datasets for quality analysis and decision-making.

CLO2: Analyze datasets using SQL queries and spreadsheet techniques to identify patterns, inefficiencies, and improvement opportunities in organizational processes.

CLO3: Develop data visualizations and dashboards using R and Tableau to present quality metrics and productivity insights effectively.

CLO4: Evaluate analytical results to support data-driven decisions while ensuring accuracy, integrity, and compliance in reporting.

CLO5: Construct end-to-end data analytics solutions by integrating data cleaning, analysis, visualization, and reporting to support productivity improvement and operational excellence.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	• Data cleaning and transformation using Google Sheets functions (TRIM, PROPER, VLOOKUP, IF) • Building pivot tables and applying conditional formatting for exploratory data analysis in Sheets • Writing SQL queries: SELECT, WHERE, GROUP BY, ORDER BY on a sample business dataset • Performing SQL JOIN operations to combine multiple tables and extract meaningful insights • Introduction to R: importing a dataset, exploring structure, and basic data manipulation using dplyr	ICT EL	1 2 5
II	• Creating visualizations in R using ggplot2: bar chart, scatter plot, and histogram with proper labels • Connecting a dataset to Tableau and building basic charts: bar, line, treemap, and map visual • Designing an interactive Tableau dashboard with filters, parameters, and a KPI summary view • Data storytelling exercise: converting analysis output into a structured slide deck or report • Capstone mini project: full analytics workflow on a real-world dataset (clean → analyze → visualize → present)	ICT EL	2 3 4 5

- **Learning Pedagogies/Methods**

(z) Classroom Lecture (CL)
(aa) Case-Based Learning (CBL)
(bb) Micro-Projects (MP)
(cc) Problem-Based Learning (PBL)
(dd) ICT-Enabled Learning through Digital Resources/ Virtual Labs/Webinars (ICT EL)

- **Assessment Methodologies**

(P) Internal Assessment

a. Internal Formative assessment (5 Marks)

xv. MCQ and Objective question Quiz: Students select or give the correct answer from the list of options four /none for a given questions.

xvi. Assignment: A practical task or setup questions given to measure a student's knowledge, skill and ability in subject or field.

xvii. Seminar: A student-led academic activity designed to evaluate student's ability to research, understand, and present a specific topic.

xviii. Group Discussion: An interactive method to asses a student's personality and inter- personal skills in team setting. It typically involves 5 to 15 participants discussing a topic for 15 to 30 minutes in presence of an observer.

b. Internal Summative Assessment (10 Marks)

ix. Mid-term tests
A test conducted roughly halfway through an academic term or semester.

x. Laboratory performance
Students demonstrate their laboratory hands-on performance skills, knowledge and ability to apply concepts in subjects.

xi. Viva-voce
An oral examination conducted to evaluate a student's in-depth knowledge, understanding, and critical thinking regarding a subject or project.

(Q) Weightage of Learning Efforts for Internal Assessment (25 Marks)

Unit	Aligned CLOs	Total Learning Hours	Approximate weightage (Marks) to Learning levels (BT)			Total Marks
			Remember (R)	Understanding (U)	Application/ Analyse & above (A)	
I	1,2,5	30	7	10	8	**15**
II	2,3,4,5	30	8	10	7	**10**
		60	**15**	**20**	**15**	**25**

Master of Science Quality and Productivity Management Semester-II

- **Assessment and Evaluation**

Sr. No.	Assessment/Evaluation	Component	Weightage (%)
1	Continuous Internal Evaluation	FA: Seminars, Assignments, Quizzes, Group Discussion	15
		SA: Mid Term Test	10
2	External Assessment	Paper Writing	25

(R) CLOs – PLOs Matrix

CLO	PLO												
	1	2	3	4	5	6	7	8	9	10	11	12	13
CLO1	1	1	-	3	-	1	2	1	1	2	1	-	-
CLO2	2	2	-	3	1	1	1	2	1	1	-	-	-
CLO3	1	-	-	2	1	3	1	1	3	3	-	-	-
CLO4	2	1	-	2	-	3	-	-	2	2	3	-	-
CLO5	2	2	-	3	2	2	3	2	2	2	2	3	2

CLO – PLO correlation	Value
Strong	3
Moderate	2
Low	1
No correlation	-

- **Suggested Learning Materials Books:**

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	Data Analytics Made Accessible	Anil Maheshwari	2017	CreateSpace Independent Publishing
2	R for Data Science	Hadley Wickham, Garrett Grolemund	2017	O'Reilly Media
3	Storytelling with Data	Cole Nussbaumer Knaflic	2015	Wiley

- **Online Resources (Open Source)**

Sr. No.	Description of Resource(s)	Weblink
1	Google Data Analytics (Coursera)	https://www.coursera.org/professional-certificates/google-data-analytics
2	SQLBolt	https://www.sqlbolt.com/
3	ThoughtSpot (SQL Tutorial)	https://www.thoughtspot.com/sql-tutorial
4	Free Training Videos - tableau	https://www.tableau.com/learn/training